




*Agricultural Freight:
Network Access and Issues*



Julie Smith, DVM, PhD
Extension Dairy Specialist
University of Vermont

Current Transportation Research

- Agricultural Freight: Network Access and Issues
 - UVM Transportation Research Center (TRC)
 - April 2007 – December 2010
- Evaluating Resilience of Vermont's Dairy Industry through Simulation Modeling
 - VT Agricultural Experiment Station (AES)
 - October 2009 – September 2011

Critical links supporting Vermont's bulk milk transportation: a novel application of the Network Robustness Index



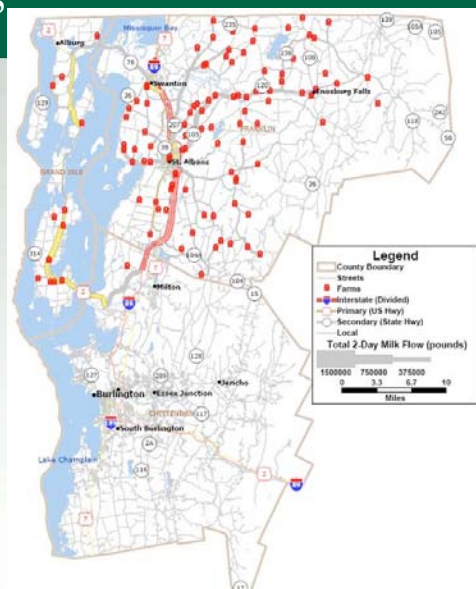
Pilot Analysis



Pilot Analysis

- This project applied the NRI to a data set representing milk flows in northwestern Vermont.
- Data for bulk milk collection routes were collected using geo-loggers carried on each truck.
- A TransCAD street layer was used as the base network.
- An origin-destination matrix representing two days of milk flows was used to calculate the NRI with TransCAD.
- For assessing the costs of disruption to the network, we used units of pound-hours, which expressed the dual importance of milk transport volumes and their corresponding travel times.
- Links associated with a higher “cost” to the system when removed received a higher ranking in terms of criticality.

Pilot Analysis



Generated with TransCAD 5.0

Conclusions

- This study represents the first application of the NRI to freight transported in a real-world network, specifically the network of bulk milk collection in northwestern Vermont.
- Four of the 5 links with the highest NRI were associated with bridges, highlighting the importance of connectivity between portions of the network.
- The criticality of these links relative to total milk flows confirmed the utility of this index as an improved method of prioritizing links over simply looking at flow volume.



Next Steps

- Conduct NRI on statewide dataset.
- Revamp manuscript for publication.
- Develop collaborative modeling proposal.





Preventative Epidemiology

- Use tools designed to predict spatial-temporal disease spread in populations of animals (Vermont dairy cattle)
 - Pre-plan to protect high risk zones
 - Pre-plan to ensure continuity of business



Objectives

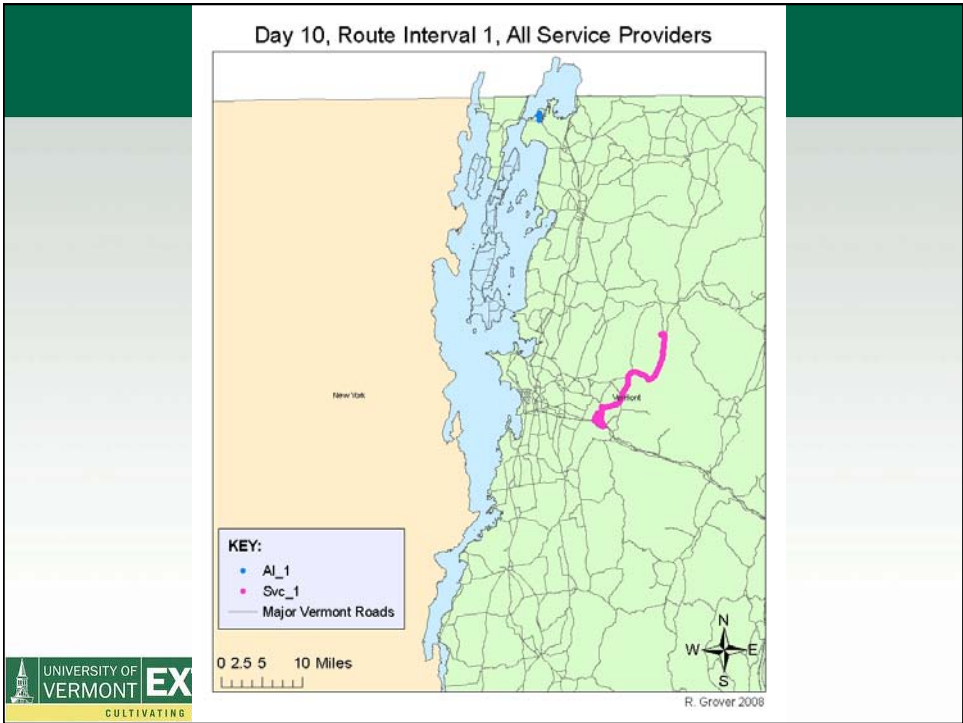
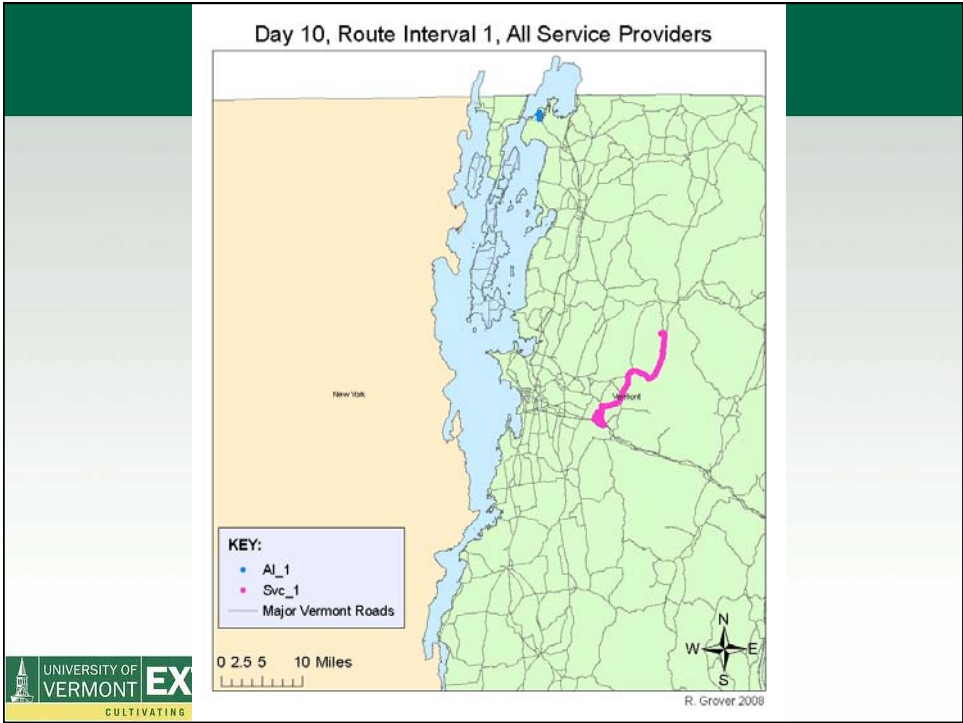
- Better understand inherent risk of highly contagious disease spread among Vermont dairy farms
- Better prepare response agencies and individuals
- Stimulate continuity of business planning among producers and allied industry

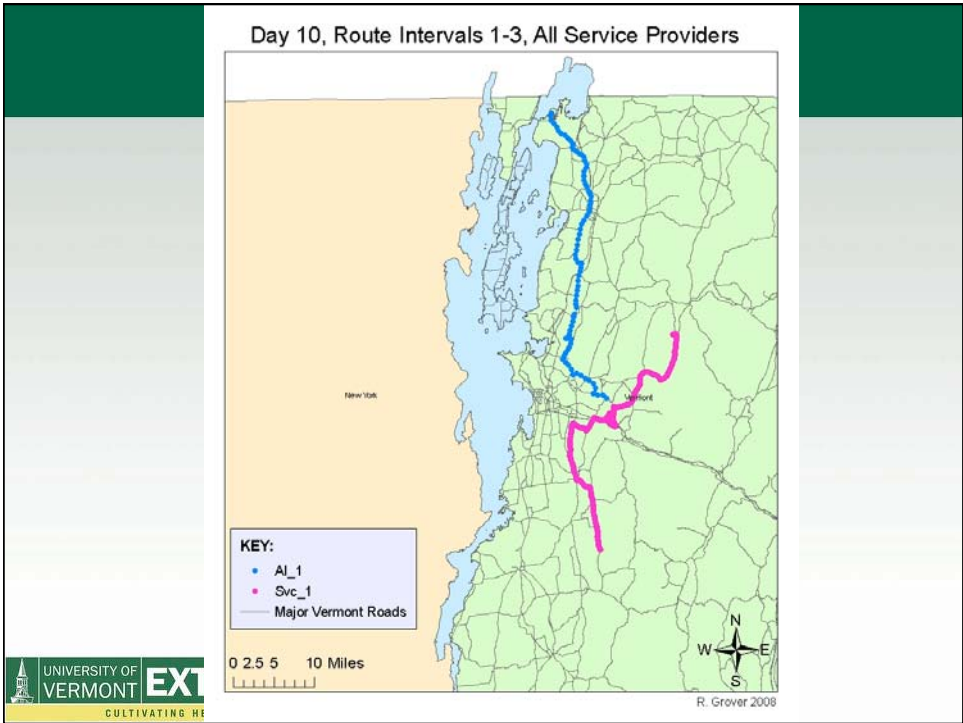
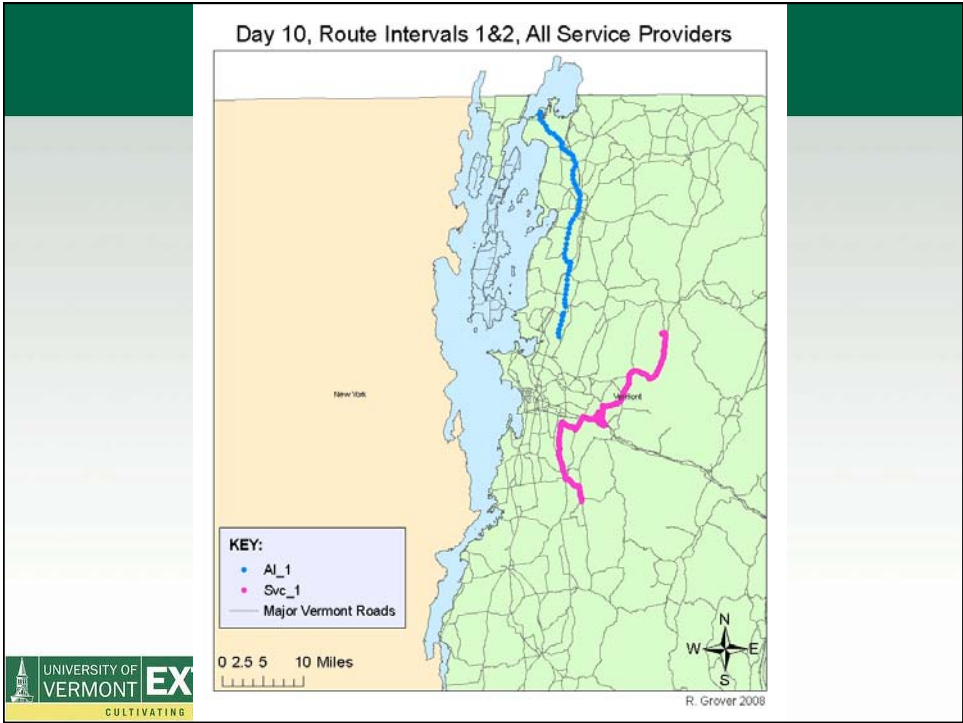


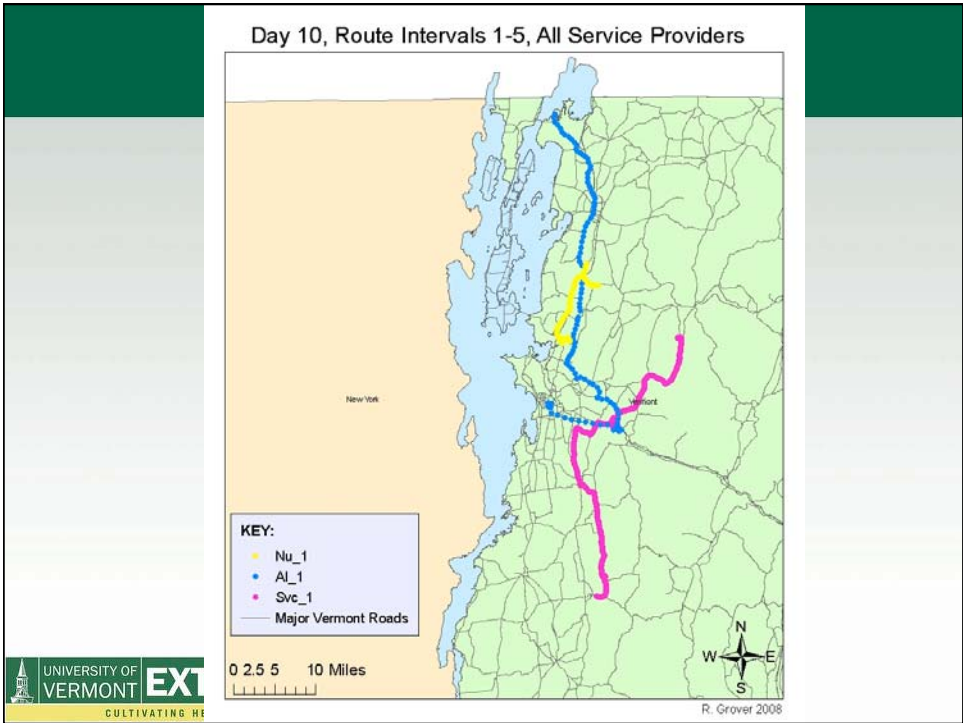
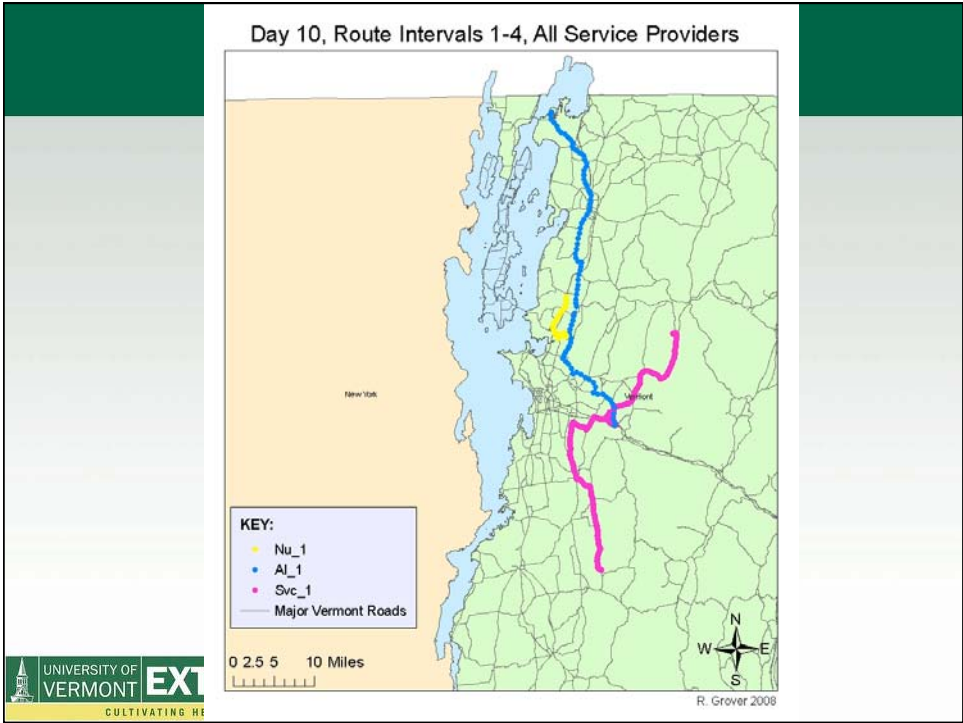
Proof of Concept

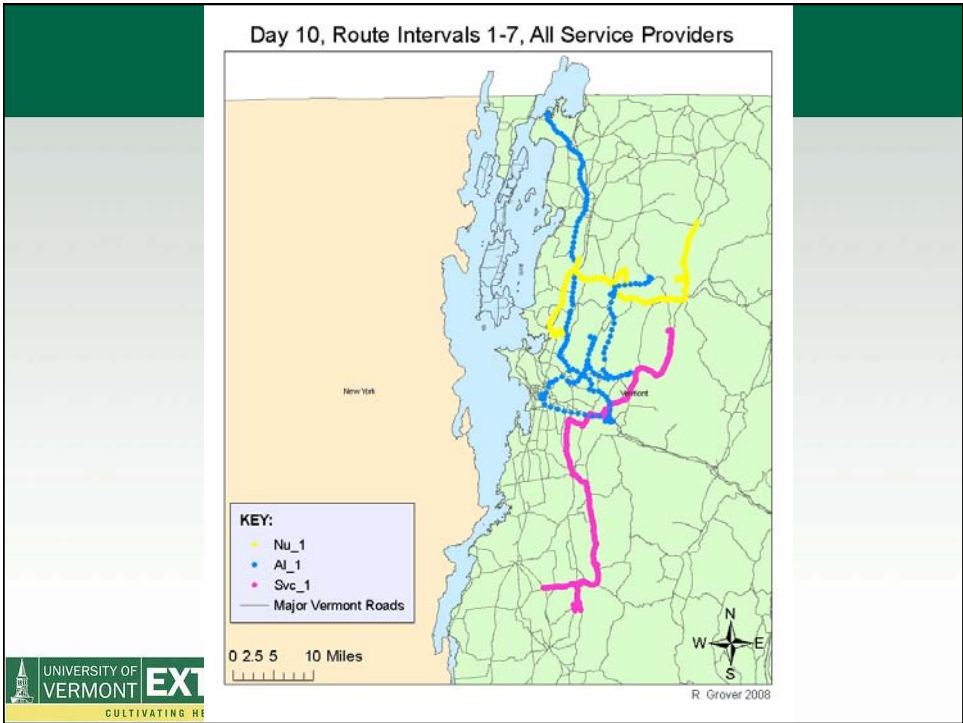
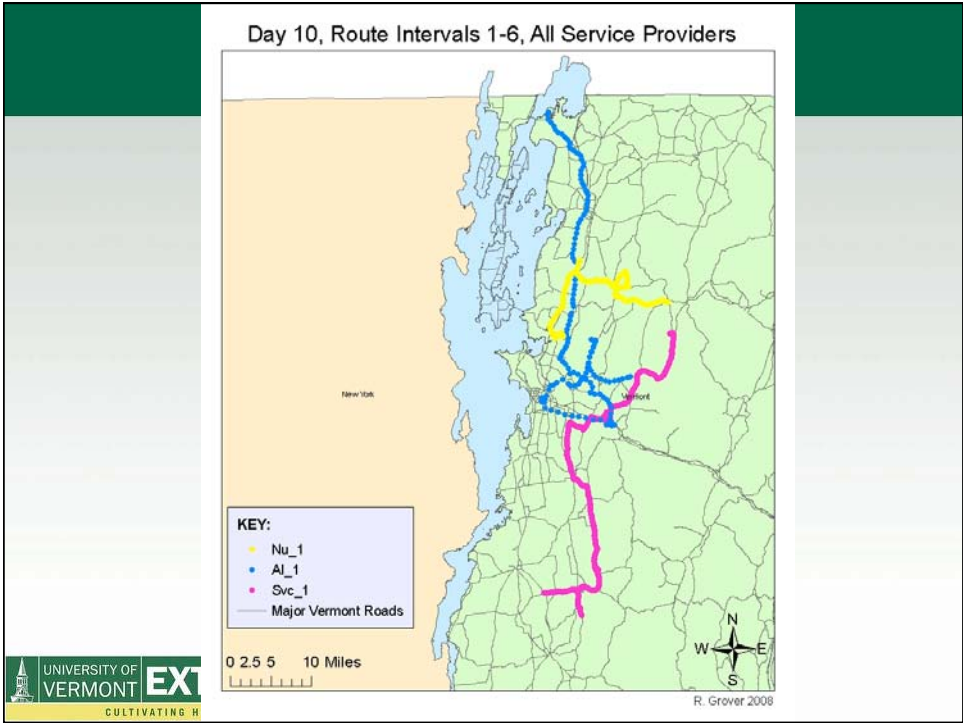
- Click the following slide to begin an animation of routes of three dairy farm service providers
- One (Svc_1) is a supply delivery route driver
- One is (AI_1) is an artificial breeding technician
- One is (Nu_1) is a nutritionist

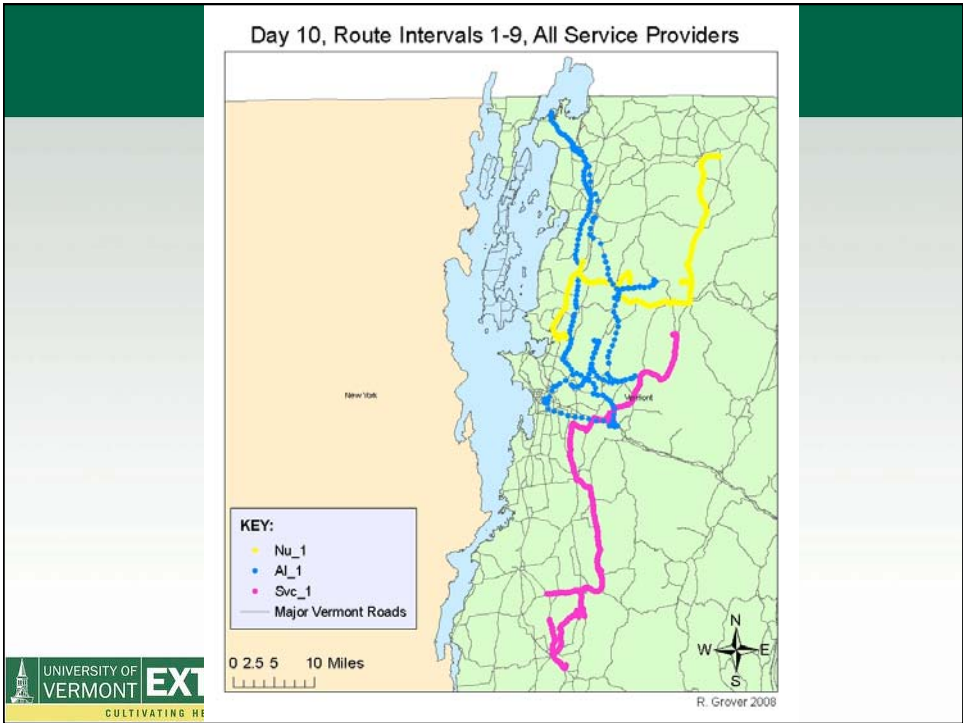
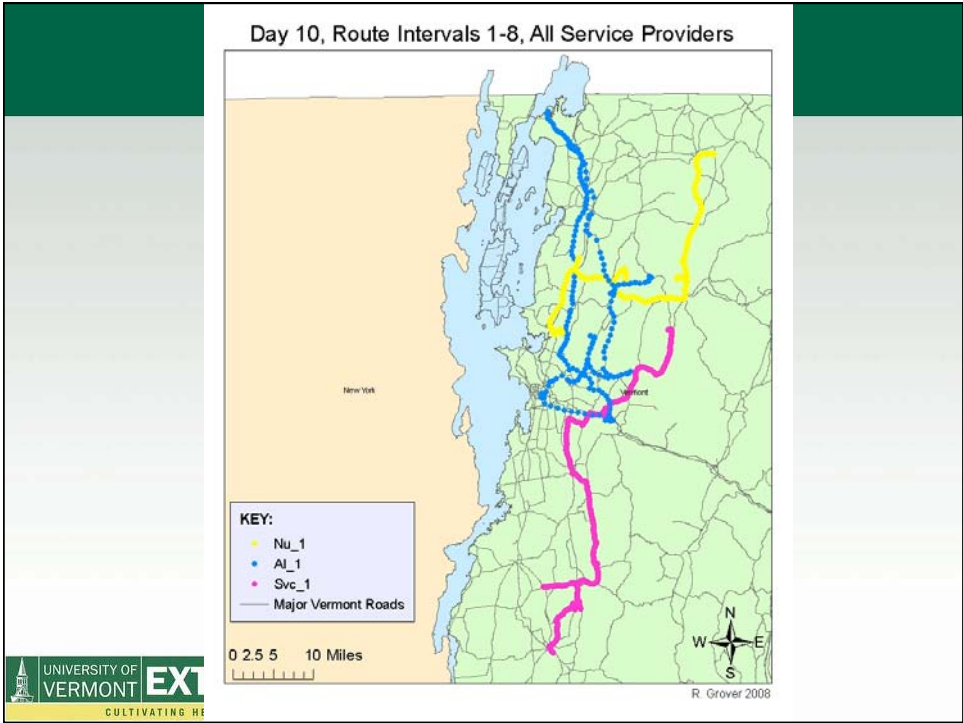


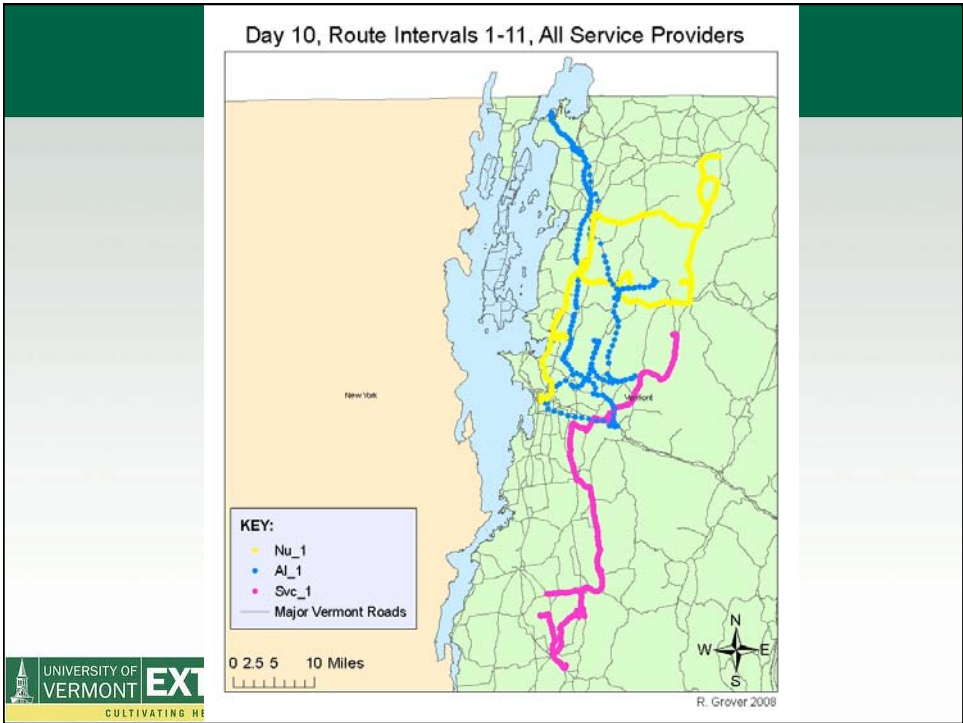
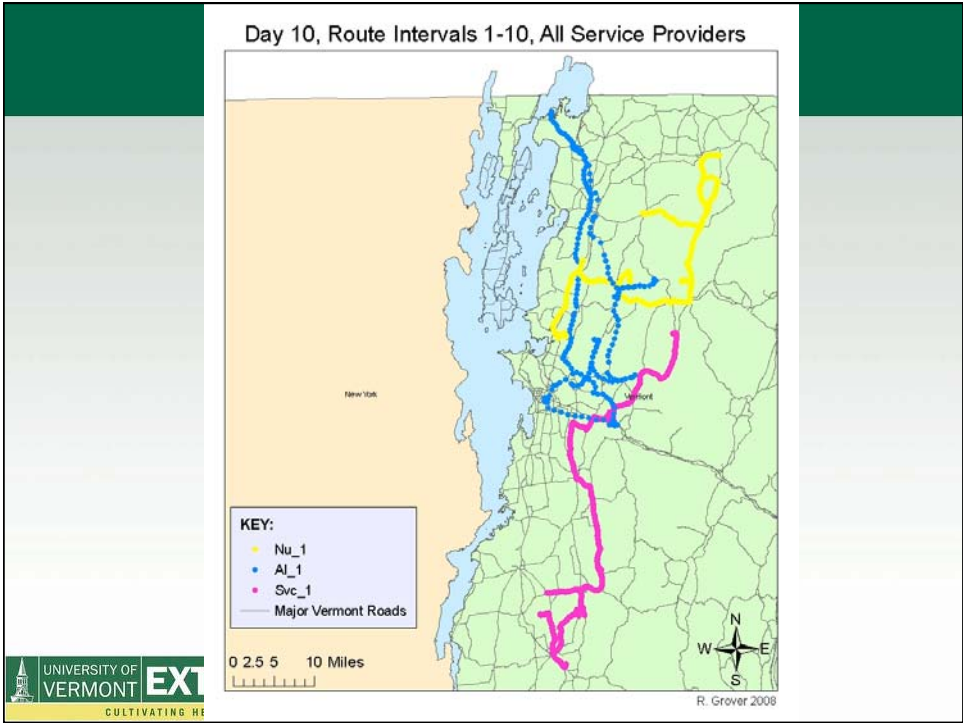


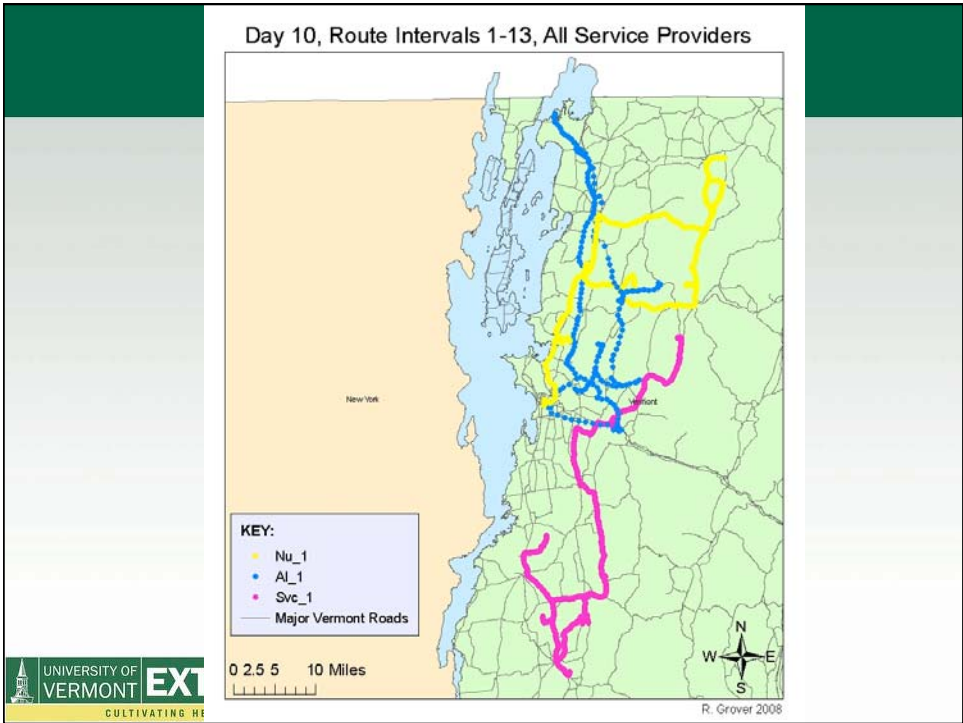
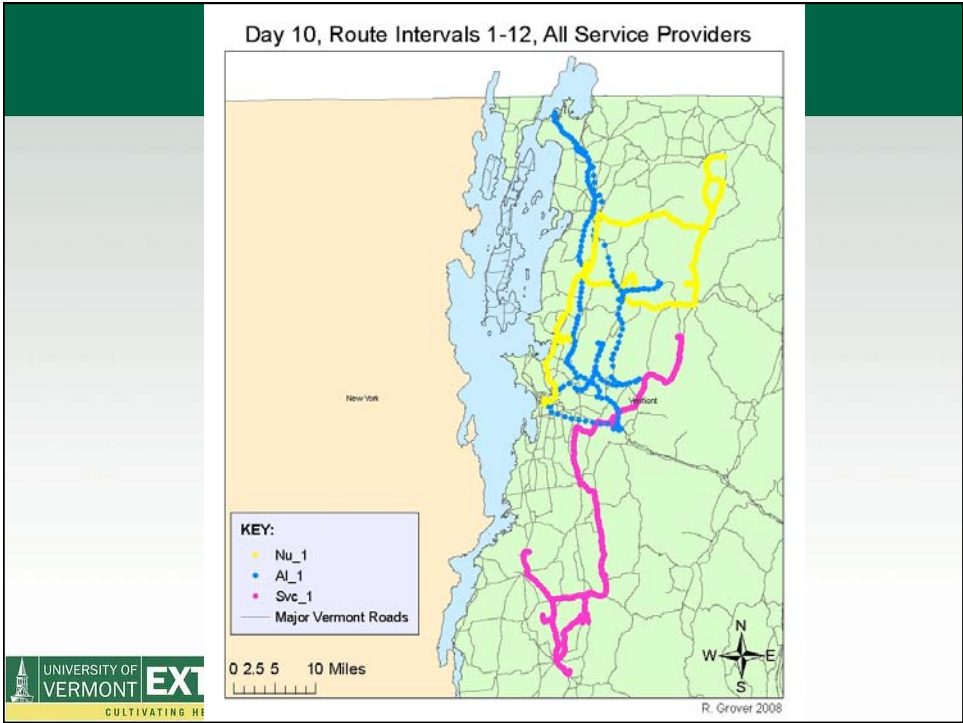


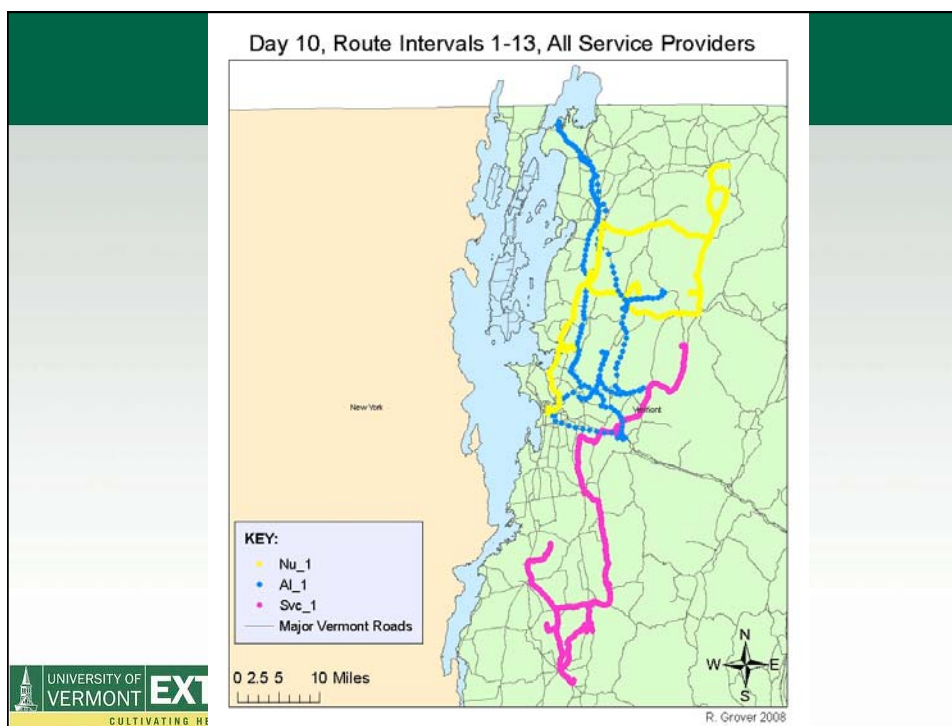












Route Overlap and Transmission Risk

- These routes demonstrate indirect linkages between farms in the major dairy counties to the north and south of Chittenden County
- These linkages could spread a highly contagious disease like foot-and-mouth disease that can be tracked on footwear and vehicle wheels
- Additional data is required for modeling

